Bundesministerium für
Ernährung, Landwirtschaft
und Verbraucherschutz

The Scientific Advisory Board on Fertiliser Issues' position on the topic of "Uranium – Health and environmental risks from the use of phosphate (P) fertilisers in agriculture"

Occassion

The Federal Environment Agency's demand for a stipulation on uranium limits in phosphate (P) fertilisers to be included in the Fertiliser Ordinance in order to protect the soil and groundwater/drinking water led the Scientific Advisory Board on Fertiliser Issues at the Federal Ministry of Food, Agriculture and Consumer Protection (BMELV) to hold an expert consultation with the aim of consolidating, discussing and evaluating the current knowledge on the topic of "Uranium – Health and environmental risks from the use of phosphate fertilisers in agriculture".

Perceptions

The uranium expert consultation held on 26 and 27 February 2013 made a major contribution towards consolidating the current knowledge on the risk assessment of uranium and its behaviour in soils and water bodies, as well as on soil-plant transfer. Based on the results of the consultation, the soil-plant transfer of uranium can be considered to be negligible. Furthermore, there were no new scientifically sound findings to prove that uranium entering the soil via phosphate fertilisers leads to measurably higher levels in surface water and groundwater, and thus in drinking water.

Due to small and large-scale geogenic factors causing significant variations in uranium concentrations in soil and water bodies, the previous findings cannot be taken as conclusive evidence of elevated uranium concentrations in water bodies resulting from phosphate fertilisation. In order to detect potential fertiliser-related inputs of uranium in water bodies, the Scientific Advisory Board on Fertiliser Issues suggests that future studies should be carried out with a more practice-oriented experimental approach (field conditions) under comparable conditions (small-scale with the same geogenic soil uranium concentrations) that also allow for a specific comparison of different intensities of agricultural land-use intensity. The currently available results from the evaluation of static long-term phosphate fertilisation experiments show that when phosphate fertilisers are applied in great excess (compared with recommended amounts and general practice), there is evidence of elevated concentrations of uranium in the topsoil but not in the subsoil.

The Scientific Advisory Board on Fertiliser Issues regards the analysis of the U234/U238 isotope ratio as an opportunity to distinguish between geogenic and fertiliser-related transport in soils and uranium import into water bodies. The validity of this method needs to be corroborated by further investigations.

Further urgently needed and highly promising approaches towards improving our understanding of the dynamics of uranium in soil are:

1. The modelling and measurement of subsoil redox and pH conditions that are influenced by nitrate inputs into the soil and which could impact on the mobility of uranium in the course of the denitrification of nitrate translocated to the subsoil. First interesting initial approaches have been reported from Mecklenburg-Western Pomerania in cooperation with the Technical University of Clausthal-Zellefeld.

2. The specification of uranium in soil solutions and water bodies, which has a major influence on uranium uptake by plants and presumably also by soil and aquatic organisms, as well as on the sorption behaviour of uranium and thus its mobility in soils. Valuable suggestions on modelling and the analytical evaluation of uranium species and the testing of biological activity arose from the contribution by Bourgignon, CEA Grenoble, France.

According to the available results, there is no indication of a risk of an intolerable negative impact on soil and sediment-dwelling organisms due to uranium inputs from phosphate fertilisers. A deterioration of aquatic communities due to uranium inputs from phosphate fertilisers in soil and their discharge into groundwater and surface water bodies cannot be categorically ruled out. However, within the scope of the risk characterisation, indications of this nature only arise in the worst case scenario. This applies to the application of large amounts of phosphate fertilisers to soils with low sorption capacity and an extremely low or high pH value.

In general, the Scientific Advisory Board regrets the insufficient transparency of the current data situation which hampers an assessment of uranium import with phosphate fertilisers into soils, surface water bodies and groundwater.

This refers to:

1. measured concentrations of uranium from the suppliers of drinking water and mineral water which should also allow for information about changes in the concentrations over time. It is incomprehensible that the German Association of Energy and Water Industries (BDEW) has not presented any concrete measured values for uranium concentrations in raw water, despite the intensive efforts made by the Scientific Advisory Board.

2. the uranium contents of mineral phosphate fertilisers in particular, but also organic fertilisers (farm manure, sludge, compost, fermentation residues) whose concentrations of uranium (U per kg P2O5) are generally lower than of mineral phosphate fertilisers, but which can lead to considerable loads due to their large application rates. Without knowledge of these uranium loads, it is not possible to draw up uranium balance sheets. Such balance sheets, along with the corresponding examination of uranium dynamics in soils on the long-term monitoring plots of the Länder, should be implemented and would enable an excellent nationwide overview of the uranium issue. The Scientific Advisory Board, therefore, proposes initiating a coordinated monitoring of uranium contents in fertilisers, soils, surface water bodies and groundwater. It points out that in order for the balance sheets to be complete, knowledge of the uranium import from deposition is also required.

The use of mineral phosphate fertilisers has undoubtedly led to an accumulation of uranium in soils. But the Scientific Advisory Board points to the fact that mineral phosphate fertilisation has significantly decreased in the last 10 years and, therefore, assumes that uranium inputs have also declined. In order to further reduce uranium inputs, it recommends the active pushing of phosphate recycling from organic waste material with low uranium content, and better distribution of the phosphate contained in farm manure on the crop land in line with good phosphate fertilisation practices (in this context, the Scientific Advisory Board refers to its opinion paper entitled "Sustainable use of the limited resource of phosphorus via recycling and increased phosphate fertilisation efficiency" of 22 February 2011).

Overall, the Scientific Advisory Board comes to the following conclusions:

1. There is not considered to be any urgent need for action with regard to mandatory labelling and precautionary limits for uranium in mineral phosphate fertilisers.

2. The Scientific Advisory Board expects that the transparency called for above with respect to the uranium content of phosphate fertilisers will contribute to excluding the use of rock phosphate with elevated concentrations of uranium from phosphate fertiliser manufacturing.

3. The Scientific Advisory Board welcomes the major scientific interest and debate that is currently focused on the question of possible increases in the uranium input in groundwater and surface water bodies, and a possible causal relationship to uranium input in soils via phosphate fertilisers. The activities that are currently being conducted at all levels (scientific community, Federal government, Länder) to study the dynamics of uranium in soils, groundwater and surface water bodies need to be better coordinated and more tightly focused in accordance with the above comments.